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LEVEL COMPETITIVENESS OF SCIENCE AND TECHNOLOGY (SCIENCE AND TECHNOLOGY) CAPTURE FISHERIES IN THE PROVINCE WEST JAVA

Asep. A.H Suryana[*], Regina R.D Handayani[**], Herman Hamdani[*], Atikah Nurhayati[*]
[*]) Lecturer of Fisheries and Marine Sciences Faculty, University of Padjadjaran
[**]) Bachelor of Fisheries and Marine Sciences Faculty, University of Padjadjaran
E-mail : asep.agus@unpad.ac.id

ABSTRACT

Marine capture fisheries has advantages of each region in area in West Java Province. The development level of the role of all relevant stakeholders is the key to the economic success of fisheries in a region. The competitiveness of capture fisheries can be used as a benchmark the regional development, regional mapping, and regional development planning. This study aims to analyze the competitiveness of capture fisheries science and technology in West Java Province. The method used in this study is a survey litelature method to identify and analyze the competitiveness of ten regencies and one city in West Java Province which have marine areas. The primary data in the form of expert judgment regarding the proportion of competitiveness of capture fisheries consistingof four staff at the The Office of Maritime Affairs and Fisheries of West Java Province and 6 lecturer at the Faculty of Fisheries and Marine Sciences, University of Padjadjaran. Secondary data such as statistical data The Office of Maritime Affairs and Fisheries of West Java Province. Data analysis was performed by using descriptive qualitative. These results indicate the very high competitiveness region is Indramayu and Cirebon. Indramayu Regency contributes the most with preserved product. Cirebon City produces the largest fish clot in West Java Province. While area that having low competitiveness is Sukabumi, Bekasi, Cianjur and Garut.

Keywords: Competitiveness, Fishing, West Java

INTRODUCTION

The volume of Indonesian fishery production during 2005-2009 experienced an average increase of 10.02 percent. The increase volume of Indonesian fishery production is mainly due to an increase in the utilization of marine fishery strategic region and an increase in faquaculture technology (The Office of Maritime Affairs and Fisheries of West Java Province 2009). Capture fisheries production in West Java Province in 2016 amounted to 276.303 tonnes, an increase of approximately 1.95% from production in 2015 (The Office of Maritime Affairs and Fisheries of West Java Province 2016).

One of Indonesia's regions that has fishery potential and can be developed as a major driver of regional and national economies is the area of West Java Province. West Java province has a coastline of 814,82 km, consisting of 399,32 km in the northern coast of West Java (Pantura) and 415,50 km in the southern coast of West Java (Pansela) and the territorial waters of the sea along the 16,450 km^2. West Java Province is bordered directly by two sea waters, namely the Java Sea waters in the north which are often referred to as the North Coast (Pantura) West Java sea waters and the Indian Ocean in the south which is often referred to as the South Coast (Pansela) sea waters of West Java. Pantura West Java region covers five regencies and one city, namely: Bekasi, Karawang, Subang, Indramayu district, Cirebon and Cirebon City. While the area of Pansela West Java includes five regions namely: Sukabumi, Cianjur, Garut, Tasikmalaya, and Pangandaran (The Office of Maritime Affairs and Fisheries of West Java Province 2009).

Economic development strategy towards industrialization carried out by an economic development strategy based on comparative and competitive advantages (Yustika 2012). This is based on the fact that firstly, Indonesia has substantial fishery resources both in terms of quantity and diversity. Secondly, the industry in the fisheries sector have linkages with other sectors. Third, the fishery industry is based on national resources or known as national resources based industries, and the fourth Indonesia has a high comparative advantage in the fisheries sector, as reflected on the potential of existing resources. Increased efficiency is done through efforts to increase the economy of scale so as to increase profits and can encourage increased new investment, ultimately able to encourage faster growth (Rustiandi 2009).

Model development of fisheries based on optimization approach in the waters of West Java can be used to formulated a general model for the development of capture fisheries that consists of seven main components, namely: fish resources, the fishing fleet, fishermen, production support facilities, the fishing port, marketing units of the catch, and fish processing unit (Sutisna 2006 Wardono in 2015).

Ratnasari (2014) explains that regional development is an integral part of national development. Regional development moreaimed at improving the quality of community affairs, economic growth and the optimal economic equality, the expansion of the workforce, and improving standards of people's living. Economic growth is a major measure of success of the development carried out. Growth should walk side by side as planned, it means creating equal opportunities and the sharing of development results are more evenly distributed.

Fauzi (2010) states that marine and fisheries development planning is based on the concept of sustainable development, supported by the development of natural resource-based industries and human resources to achieve high competitiveness. Three main things that do related to the direction of fisheries sector development in the future, namely (1) build a fisheries sector that has competitive advantage based on comparative advantage; (2) describe a democratic economic system which is based on fair market mechanisms; (3) accelerate the development of an effective and strong regional economy by empowering regional economic actors and potentials. In the context of the development pattern, there are three phases to

be followed in comparative advantage to transform into an advantage in terms of competitiveness, namely (a) the development phase driven by an abundance of natural resources (resources driven); (B) The second phase of development is driven by investment (investment-driven) and; (C) The third phase of development that is driven by innovation (inovation driven).

Marine capture fisheries activities contained in the ten regencies and one city in the West Java Province. Great potential fishery resources in West Java Province strongly supports the development of fisheries, but has not been fully utilized. Challenges faced by each region in West Java Province in the implementation of the development strategy is how to increase productivity and efficiency in the fisheries sub-sector in fishery produce a commodity that can provide great added value to the community, to optimize all of its potential. Increased productivity and efficiency of the fisheries sub-sector in Indonesia can be done when local governments know the potential of the area because of the large contribution that is determined by the amount of production of the commodity.

One of the important sectors in capture fisheries is the treatment of fisheries production. Until now, fish generally consumed directly, but the fishery products have perishable character that require special handling to maintain the quality. Processing and preservation is an effort to improve the quality of power saving and durable post-ments fishery products. The purpose of processing and preserving fish in principle is an attempt to deal with the excess production and while keeping the quality of the fish before it is marketed or consumed, increase the sale value of the fish, as the diversified food ingredient and for extending the shelf life of fish (Afrianto 2011). Based on statistical data of capture fisheries in West Java (2017) there are several types of fisheries production treatments, including:

a. Salting or drying. Fish that are undergoing the process of salting become preserved because salt can inhibit or kill bacteria that cause spoilage in fish (Afrianto 2011).
b. *Pemindangan*, boiled fish processing aims to extend the durability and provide added value to fishery products (Alyani et al., 2015).
c. Brewing or fermentation is a process of change carbohydrates into alcohol. Substances that are working on this process is that the enzymes created by yeast cells. The duration of the fermentation process depends on the material to be fermented (Ginter et al., 2018). Products processed through fermentation process usually has a distinctive taste and aroma. The formation of flavor and aroma, is influenced by the addition of salt concentration (Ahilah et al., 2017).
d. Fumigation is actually a process that is a combination of salting, drying and fuming itself. The salting process makes the fish meat becomes more tastier and durable. Besides, the fish meat more compact due to reduced levels of water so that the activity of microorganisms can be inhibited. Drying aims to reduce levels of water and get a good texture (Ghazali et al., 2014).
e. Freezing. Things that should be considered in fish freezing is the speed of freezing fish or the amount of material that can be frozen per unit time. Clotting time is the time required to reach the freezing temperature, cooling temperature, the size of the fish, the temperature of the fish and the number (coefficient) thermal conductivity. The freezing temperature is freezing desired final temperature and the freezing temperature of the freezing point of fish has been exceeded thus inhibiting the growth of fungi and bacteria (Anjasari 2010).
f. Canning is one form of modern fish preservation using high temperature (sterilization) and packaged in hermetic. Canning allows the product to avoid decay or damage, changes in water levels, damage due to oxidation or no change in

taste (Fadli 2011).Mayasari (2013) defines a fish canning as a way of preserving food (fish) that is packaged in hermetic (impervious udaha, water, microbes and other foreign matter) and sterilized. The aim is to protect fish canning of decay and damage or extending mendiversifisikasikan durable and fishery products.

g. Fishmeal is a dry solid product produced by removing the liquid and some or all of the fat contained in fish flesh. Processed fish meal or prepared to be used as partial additive for animal feed and fish (Fatmawati and Mardiana 2014). Fish meal is one of the raw materials needed source of animal protein in animal feed and fish composition. Animal protein is produced by the essential amino acids such a complex, amino acids lysine and methionine. Besides, it also contains minerals (Tampubolon et al., 2018).

The concept of competitiveness was popularized by Porter in the book of The Competitive Advantage of Nations (Porter 2009) which examines the creation of prosperity and competitiveness in the global economy. This book has influenced the policies of supranational, national, regional and global basis. Further, also described the importance of the productivity potential of the region which is based on human resources, natural resources, and capital. Furthermore, Porter argues that the potential of the region is not an element of competitiveness, but it is a resource that should be developed and production to support the competitiveness of the two elements, namely macroeconomic and microeconomic (Yogi et al 2018).

Dahuri (2003) states that level development role of all relevant stakeholders is the key to the economic success of fisheries in a region. Marine capture fisheries sector have their respective advantages of each region in West Java Province. Competitiveness in the application of capture fisheries science and technology can be used as a benchmark for regional development, regional mapping, and regional development planning. Until now there has not been much research done to determine the application of science and technology competitiveness of capture fisheries in West Java. Therefore, it is important to examine the application of science and technology competitiveness of capture fisheries in West Java. This is because with these studies can compare the competitiveness between different areas of capture fisheries. Besides this research in fisheries can become comparable data that can be used by subsequent researchers in the future.

METHOD

The research was conducted at the Department of Marine and Fisheries of West Java province in May-September 2019 aims to analyze the competitiveness of the application of science and technology profile of fisheries in West Java province. The method used in this study is a survey litelature method to determine the application of science and technology competitiveness of fisheries 10 counties and one city in the province of West Java. The data used are primary data and secondary data are realized in the form of numbers and analyzed using descriptive statistics. The technique used to take primary data in this study in the form of expert opinion (expert judgment). Secondary data obtained from statistical data Marine and Fisheries Agency of West Java Province.

DATA ANALYSIS

Data analysis was performed by using descriptive qualitative. Descriptive qualitative analysis in this study is to obtain a the application of science and technology competitiveness of capture fisheries profile in the District/City of West Java Province.

Profile analyzes the application of science and technology competitiveness of fisheries in the District / City of West Java Province through several phases, as follows:

1. Define variables and sub-variables of the application of science and fisheries.

2. Implementation phase of research that retrieves data capture fisheries of West Java province in 2017.
3. Identifying priority weight or level of relative importance among variables and sub-variables.
4. Taking the primary data in the form of expert judgment that gives weight to the main indicators and variables. The experts who were interviewed as many as 10 people consisting of lecturers from the Department of Social Economic FPIK Padjadjaran University and lecturers from the Department of Water Resources FPIK Padjadjaran University, and 4 people from Marine Affairs and Fisheries Office of West Java Province consisting Head of Capture Fisheries, Head of Section of Management of Fish Resources and Fishermen of West Java Province, Head of Section of Fishing Vessels and Fishing Equipment and Head of Section of Fisheries Port.
5. Calculating the weight of the questionnaire on expert judgment each of the variables and sub-variables.
6. Perform data processing have been obtained during the study, using secondary data, statistical data capture fisheries of West Java province in 2017 to determine the competitiveness profile of each region/city.
7. Calculating the score and the value of variables and sub-variables of secondary data and calculate the value based on weight and score.

   score $= \frac{Data\ each\ region/city}{Total\ data\ of\ Province}\ x\ 100$

   Value = Weight x score
8. Warned of the competitiveness of fisheries among all regencys / cities in West Java Province based on the value weighted.
9. Specifies criteria for the competitiveness of fisheries throughout the regencys / cities in West Java Province using quartiles with Minitab application. The criteria are divided into four quartiles, Q_1 is an area with very high competitive, Q_2 is an area with high competitiveness, Q_3 is an area with sufficient competitive, Q_4 is an area with low competitiveness.

RESULTS AND DISCUSSION

The results of this study in the form of the application of science and technology competitiveness ranking among regions/cities in West Java. The ranking of competitiveness as a whole indicates the relative position of an area to another area with regard to all of its variables and how far the region can realize the potential of its variables. The application of science and technology competitiveness of fisheries from 11 regions/city can be determined through calculation quartile value will be Q_1, Q_2, Q_3, and Q_4. Values that are owned by the respective district / city of West Java province will describe the level of competitiveness is high or low. Q_1 is a highly competitive area is very high, Q_2 is a region of high competitiveness, Q_3 is pretty competitive region, and Q_4 is a low competitiveness area.

Indicators of the application of science and technology in the handling of fishery products can be decomposed into four sub-variables. Among them sub-variables, processed fish is preserved, frozen, canned, and fish meal. Based on the rating can be seen in the dominance of the north coast region of West Java province with very high competitiveness category. Districts / cities are namely, Indramayu and Cirebon. The lowest-ranked and categorized as low competitiveness is dominated by pansela region of West Java Province, namely, Sukabumi, Cianjur, Garut and Bekasi are located in the northern coasts of West Java (Table 1).

Another picture that can be seen from the results quartile district is a district very high competitiveness is dominated by the districts located in the northern coast of West Java Province. Low competitive districts located in two different regions. Pantura area is Bekasi, West Java, West Java while pansela area is Sukabumi, Cianjur and Garut (Figure 1). Table 1 and Figure 1 show thatThere are two districts that are in quartile one in the competitiveness of the application of science and technology in the management of fisheries results in the area of the north coast of West Java. Indramayu

district was ranked first by the main indicators of the application of science and technology in the handling of fishery products with a value of 52.74. This indicates that the Indramayu district is a district that has the potential for application of science and technology in the handling of fishery products that support fisheries. Production of processed fish in Indramayu give the largest contribution compared to other districts in the coastal areas of the northern West Java province that is equal to 50% of the total amount of processed fish production in West Java province. Production is dominated by processed fish products preserved with dried or salted as much as 8.147,61 tonnes (The Office of Maritime Affairs and Fisheries of West Java Province 2017.

Table 1. Competitiveness Rating Regency / City Bersadarkan Application of Science and Technology West Java province

District / City	The application of science and technology	Ranked	Category Competitiveness
Indramayu District	52.74	1	Very high
Cirebon city	27.86	2	
Subang Regency	17.59	3	High
Cirebon	0.99	4	
Karawang regency	0.42	5	
District Pangandaran	0.34	6	Enough
Tasikmalaya District	0.07	7	
Sukabumi District	0,00	8	Low
Cianjur Regency	0,00	9	
Garut	0,00	10	
Bekasi	0,00	11	

(Source: Data Processing)

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Cirebon city located in the northern coast of West Java region ranks second with extremely high competitiveness category. The final value of the application of science and technology indicators in the handling of fishery products amounted to 27.86 Cirebon City. This shows that the city of Cirebon is still in the category of a very high competitiveness and potential in fisheries activities in West Java province. The entire production of processed fish Cirebon form of frozen products, a total of 3635.62 tonnes (The Office of Maritime Affairs and Fisheries of West Java Province 2017).

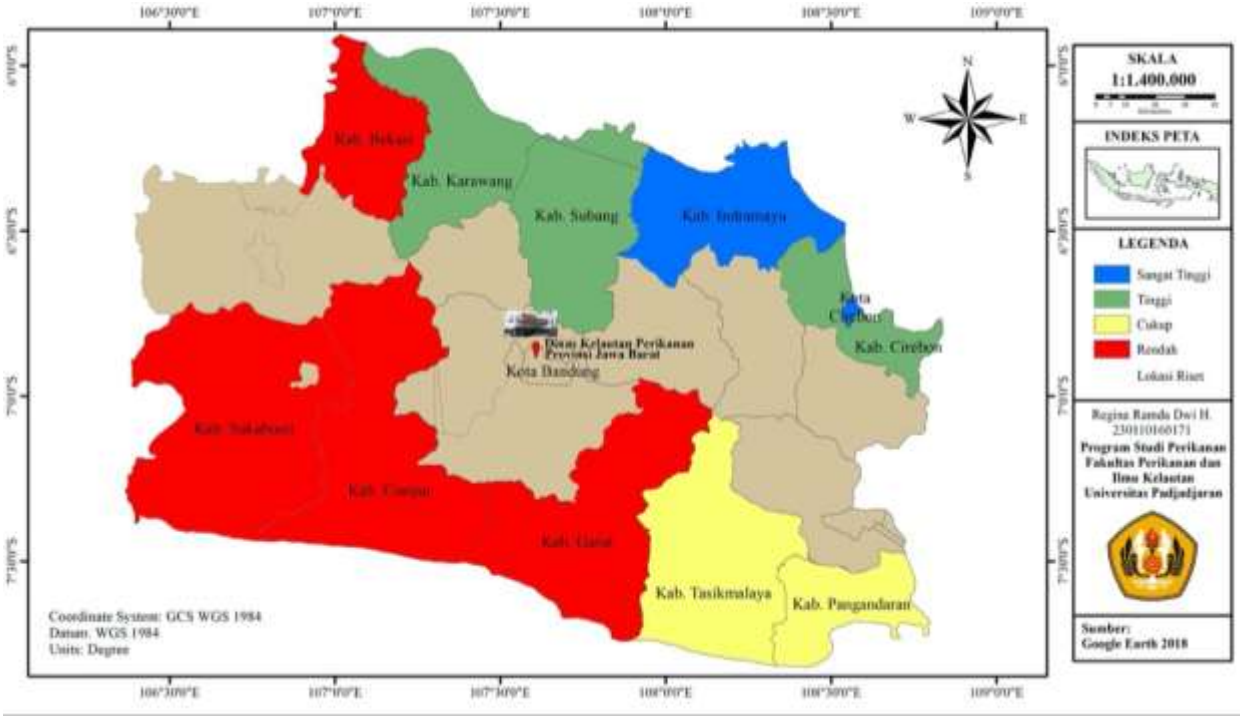

Figure 1. Map of the Application of Science and Technology Competitiveness of Capture Fisheries in West Java

Sukabumi, Cianjur, Garut and Bekasi is a district that occupies the lowest rank, respectively 8th. This Kebupaten pansela dominant in the area of West Java, except Bekasi. The final value of each of the four districts of 0.00. This means that the value obtained is very low, it is no wonder the four districts / cities occupy the category of low competitiveness. The fourth district is not producing fish that is processed.

Strategies that can be done to improve the competitiveness of human resources of fisheries in West Java province is based on research conducted as follows:

1. Improving human resources through training and educational accordance with the carrying capacity of the fishing itself, cultivate work culture, thereby building the economy of human resources either by raising labor productivity.
2. Applying science and technology developments in the management of fisheries results in order to increase the income of fishermen.

CONCLUSION

Based on the research that has been conducted obtained some conclusions as follows:

1. Indramayu District ranks first category application of science and technology competitiveness of fisheries are in the quartile with the final score of 52.74. Cirebon city ranks second with a final score 27.86. Both districts are located in quartiles one, namely the very high competitiveness.
2. There are four districts are located in four quartiles which means to have a low level of competitiveness. District who occupy the lowest rank is Sukabumi, Cianjur, Garut, and Used with value 0.

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