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Analysis of Fisheries Business Development in order to Increase Gross Regional Domestic Product in Sukabumi City, West Java

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ABSTRACT

The purpose of this study is to analyze the potential fisheries sub-sector to be developed in order to increase GRDP, in Sukabumi, West Java. Secondary data were obtained from BPS and related agencies, then analyzed using Local Quotient (LQ), Klasen Typology, and linear regression. The results showed that the order of potential to be developed was the ornamental fish cultivation sector, the second was the fishery product processing sector, the third was the fish hatchery sector and the fourth was the fish rearing sector. Based on the LQ value, the fishery product processing sector is the base sector with a source of raw materials for capture and freshwater aquaculture. The results of the regression analysis show that all fisheries sub-sectors contribute to regional income, starting from hatcheries, rearing, processing and production of ornamental fish.

KEYWORDS

fisheries; gross regional domestic product; local quotient

INTRODUCTION

Regional development can be done through efforts to grow the local economy so that the region has competitiveness and independence by mandating local resources. Local resources are easier to develop because they are part of the culture of the local community. An area is said to be advanced if there are local resources managed by the local community as a source of livelihood by continuing to develop following the development of science and technology so that they are able to compete and generate increasing income. With the development of the business world and the development of the business world and the development of the application of technological results in all fields in the midst of an increasingly and complex society so as to meet the needs of an increasingly dynamic and practical society, it is necessary to make arrangements regarding rights and obligations (Sipayung, 2022). Each region has a different flagship, the diversity can meet the overall needs of the surrounding community and even the needs of the national community in general, which spurs economic growth. The role of the marine sector in the Indonesian economy is that the sector's production supports around 7.86% of the economy, while the shipping sector contributes around 6.06% to the people's income and 4.12% to the labor force. Therefore this sector needs to continue to be developed. (Nurkholis et al., 2016).

Fisheries catch and aquaculture prevent growth retardation as it plays a key role in ending global hunger and malnutrition, high protein content and attractive amino acid and fatty acid profile to provide humans with high quality protein in large quantities Possibly. Fish is a good source of amino acids, and fatty acids can be served by steaming or pressure cooking. (Pasaribu et al., 2020). Aquaculture production is one of the economic sectors in Sukabumi city that can continue to be developed to increase the Gross Regional Domestic Product of the local area which has an impact on the welfare of its people. It is expected

that this sector will grow 10.1 tons per year, which is followed by the fishery product processing sector utilizing capture fisheries and aquaculture fisheries. This sector needs to be integrated from upstream to downstream with the principle of increasing production scale, productivity, competitiveness and added value of sustainable fisheries resources. The results showed that well-managed fisheries saw a 10% increase in annual population fishery income, ownership of local resources to generate benefits for the local economy. (Villasante et al., 2022).

At the West Java level, the contribution of the fisheries sector to the Gross Regional Domestic Prodct experienced an increasing trend of 0.88% per year. At the Sukabumi city level, the contribution of the fisheries sector to the Gross Regional Domestic Product is 6% per year (Rp 436,610.87 million/year 2020) and the Gross Domestic Product of the agricultural sector in 2020 was recorded at 1.75. The fisheries sub-sector showed positive growth, increase 9.69% in the second quarter of 2021, although the Covid-19 pandemic still hit Indonesia, this shows that it can still be improved if the fisheries sector is sold in processed form, because the trade sector contributes 40% to the Gross Regional Domestic Product of Sukabumi city, fisheries must be managed to achieve environmental and socio-economic sustainability. Fisheries in Sukabumi include capture and aquaculture fisheries, for capture fisheries that need to be considered is sustainability, fisheries management requires an increase in the minimum size of first catch (Lc) and a significant reduction in fishing deaths (F). To achieve sustainability and reduce sustainability risks, area-time protection to achieve sustainability > 98%, (Ault et al., 2022).

Economic development is a process of economic transition involving the structural transformation of an economy through industrialization, rising GNP, and income per head (Mansaray, 2021). The rapid development of technology in fish farming shows the existence of various techniques in fish farming such as bioflok system and floating jarring, with narrow room conditions, the use of bioflok is very helpful in fish farming, while for a large area of land it can be used fish pond system that can accommodate hundreds of thousands of fish heads thus raising fish can be done anywhere, with appropriate technology. Sukabumi City has fishery potential from upstream to downstream, ranging from seed production, seed enlargement, fish processing and raising ornamental fish, which is currently trending with high demand for domestic and foreign countries. Fisheries contribute positively to the local economy (capital and labor) and impact national fish yields by providing an effective policy and regulatory framework. (Ng'onga et al., 2019)

The 2020 statistical data shows that the fish hatchery potential in Sukabumi city is 24 million heads, the fish magnification potential is 1,241 tons, the fish processing potential is 2,743 tons and the potential of ornamental fish is 1.2 million heads, this can still be optimized by conducting an analysis of the dominant fishery factor optimized to increase west Java's Gross Regional Domestic Product. The potential of this fishery, both capture and aquaculture, can still be increased because it can still minimize the amount of loss during post-harvest including physical loss, quality loss and droplet loss. Post-harvest fish loss (PHFL) occurs Estimated global losses of 10-12 million tonnes/year in global fisheries (Mavuru et al., 2022).

RESEARCH METHODS

The research was conducted in the city of Sukabumi, West Java, as one of the provinces with the superior fishery commodities. Data was taken in a time series from 2010 to 2020, then analyzed using multiple liner regression. To find out whether this fishery sector is the leading sector in West Java analyzed using the Local QuotiEnt index, Klasen Typology is used to determine the growth rate of a sector with the same sector in the wider region, the

results obtained are used to compile recommendations for West Java Province as input in order to increase GDP from the fisheries sector.

RESULTS AND DISCUSSION

General Conditions of Fisheries

The results of the Central Bureau of Statistics analysis from 2010-2020 show that the hatchery fishery sector which continues to be cultivated, there are 6 types of fish with developments from 2016-2020 as follows:

Table 1. Average fish seed production in Sukabumi in 2016-2020

No	Fish	Production (thousands of heads fish)	Production value (thousand rupiah)
1	Tilapia fish	16.917	2.514.767
2	Carp fish	6.490	754.998
3	Gold fish	9.496	2.227.169
4	Gurame fish	704	1.307.088
5	Patine fish	1.318	245.799
6	Bawal fish	1.115	394.689
	Total	36.040	7.444.509

Source : Central Bureau of Statistics (BPS, 2016-2020)

Based on the data mentioned above shows, 3 types of fish that have a high level of seed demand, namely tilapia fish, then catfish and goldfish seeds. This hatchery process has a wide market because it requires enlargement elsewhere. Appropriate technology is still needed in the development of the fish hatchery process to meet market needs. Each farmer has his own expertise, therefore it is necessary to improve skills in order to master the appropriate hatchery technology for increasing baby fish production. Positive effect of zeolite material is confirmed by prolonged improvement in water quality. Due to the zeolite of Mordenite Mangan, the water content of consumption can be reduced by almost 70% in aquarium settings and 40% in fish breeding conditions (Skleničková et al., 2020).

Groups of fish rearing farmers usually use a system of slow pool, quick pool or rice minas. In a city with a small area of land, raising fish with a calm water pond system is mostly done using bioflox or artificial ponds. Improved aquaculture techniques, genetic improvement of farmed fish and sustainable exploitation of fishery resources are able to increase the incomes of fish farmers, consequently leading to the eradication of global poverty by 2030, ambitious goals set by the United Nations, (Lu & Luo, 2020). The results of the analysis of fish enlargement production can be seen in the table below :

Table 2. Production and Value of Aquaculture Production in 2016-2020

No	Production value in **Tons**	Slow water pool	Quick water pool	Rice Minas	Total
1.	Tilapia fish	12.754	434		13.188
2.	Carp fish	4.386	33	249	4.428
3.	Gold fish	10.504			10.504
4.	Gurame fish	204			204
5.	Patine fish	149			149
6.	Bawal fish	402			402
	Total	28.399	467	249	28.875

Source : Department of Food Security, Agriculture and Fisheries (DKP3, 2021)

Based on these data, it is seen that there is still an opportunity to increase the area of fish magnification area to increase the production and value of fish enlargement so that

there is a greater increase in the number of fishery production that can overcome the unemployment rate of the local community. It is necessary to choose an effective and efficient type of fish that has a large market share, easy in maintenance, short maintenance time and favorable price. The use of superior fish seeds can increase the profitability of business actors and improving the quality of feed also provides a significant increase in profitability but improving the quality of feed also increases the costs needed in one harvest (Suryani et al., 2021)

Based on the sales value of fishery products from 2016-2020 can be described in the table below :

Table 3. Production and Value of Aquaculture Production in 2016-2020

No	Production value in million rupiah	Slow water pool	Quick water pool	Rice Minas	Total
1.	Tilapia fish	12.754	434	-	13.188
2.	Carp fish	4.386	33	249	4.428
3.	Gold fish	10.504	-	-	10.504
4.	Gurame fish	204	-	-	204
5.	Patine fish	149	-	-	149
6.	Bawal fish	402	-	-	402
	Total	28.399	467	249	28.875

Source : Department of Food Security, Agriculture and Fisheries (DKP3, 2021)

From the data above, it can be said that it can still be increased the value of fish enlargement production so that it can increase the GDP of West Java. The increase in income of each farmer differs depending on the type of fish cultivated, the results of the study show that there is income inequality between fish farmers (Wamukota et al., 2014). The follow-up that can be built is business ethics between fish farmers and traders so that there is price stability in the marketing of fishery products so as to spur an increase in the number of people who do fish enlargement. How to cultivate and post-harvest determines the quality of fish, quality-based prices and value-added opportunities in downstream processing and marketing (Sogn-Grundvåg et al., 2022).

Sukabumi City aquarium fish production amounted to 835 thousand heads with a production value of Rp. 3.9 billion. The types of ornamental fish produced in Sukabumi City are quite diverse and have a high economic value (table.4). The most widely produced aquarium fish species are Koi fish with an average production of 339 thousand heads per year .

Table 4. Average Production of Aquarium Fish in Sukabumi City in 2017-2020

No	Commodities	Production (tail)	Production Value (thousand Rupiah)
1.	Koi Fish	339.790	3.397.897
2.	Koki Fish	45.335	364.554
3.	Cupang fish	12.899	16.861
4.	Baster/Komet Fish	314.834	59.896
5.	Other aquarium fish	122.894	101.486
	Total	**835.752**	**3.940.694**

Source: Department of Food Security, Agriculture and Fisheries (DKP3, 2021)

Aquarium fish have a high value because a different price in each country, the export of aquarium fish has a great opportunity in meeting the needs of aquarium fish in the international market.

The average production value of the fisheries processed sub-sector amounted to Rp. 101 billion from the average production of 2.5 kilo tons per year. This shows that the fisheries processing sub-sector has the most added value compared to other fisheries sub-sectors.

Table 5. Average Production and Value of Fisheries Processed Production in 2016-2020

No	Processed Types	Production (Tons)	Production Value (Thousand Rupiah)
1.	Surimi	1.292	58.154.474
2.	Pindang	1.186	41.503.025
3.	Other Processing	99	1.972.869
	Total	**2.577**	**101.630.368**

Source: Department of Food Security, Agriculture and Fisheries (DKP3, 2021)

Sukabumi City's fishery processed products are divided into 3 categories, namely surimi processing, pindang and other processing. Surimi processing is a type of processed with the largest production of 1.2 kilo tons with a production value of 58 billion per year. Pindang is the second largest processed commodity with an average annual production of 1.1 kilo tons with a production value of 41 billion. From these data, it can still be increased the volume of processing of fishing and aquaculture products which has an impact on community empowerment and increasing the value of GDP. In Peru, small-scale fisheries are essential for food security, accounting for about 2/3 of all fish consumed nationally. One of the most important resources that are more affordable for local and regional consumption, it is recommended that government efforts should focus on facilitating the cultivation and processing of fishery products (Grillo-Núñez et al., 2021)

LQ Value of Fishery Products

Location Quotient Analysis (LQ) is a comparative analysis technique in determining whether a sector is a base or non-base sector. The base and non-base sectors determine the ability of a sector to meet its own needs and the export capacity of a region's economy. Location Quotient (LQ) is used to measure the concentration of a sector in an area by comparing the roles of the same sector at the regional or national level in the economy of the region. The Agriculture, Forestry and Fisheries sector has an LQ value of 0.5 which indicates that this sector is not a base sector in Sukabumi City . For the fisheries sector, processed fisheries show LQ 4.74 which indicates this is a base sector, the overall result is displayed in the table below:

Table 6. Sukabumi City Fisheries Sub-Sector LQ Value 2016-2020

No	Sub Sector	2016	2017	2018	2019	2020	Average
1.	Fish enlargement	0,33	0,40	0,52	0,35	0,32	0,39
2.	Hatchery fish	0,18	0,10	0,15	0,41	0,42	0,25
3.	Aquarium fish	0,15	0,37	1,33	0,19	0,35	0,48
4.	Processing fish	4,67	6,22	3,64	5,51	3,67	4,74

Source: Processed by researchers (2021)

To support this base sector, the hatchery sector and the fish enlargement sector must be improved, especially fish that have local superiors, the use of autofeeder technology in shrimp farming originating from Thailand, changing the type of feed used. The preferred physical characteristics of feed for autofeeders have been changed to avoid damage to the feeder. Dust levels should be low and water stability less important because shrimp pick up pellets quickly. In Thailand, where a large number of ponds feed shrimp using autofeeders (Merican & Sanchez, 2016)

The food safety risks identified are related to lack of biosecurity measures in fish farms, lack of cold chains and access to running water, poor hygiene practices by all handlers, lack of fish inspections at all levels, lack of use of protective clothing and limited health

checks of handlers, therefore such factors must be minimized to reduce fish damage during transport. (Grema et al., 2020).

Multiple Regression Analysis Results

Multiple linear regression analysis is an econometric analysis tool to predict the influence of various dependence variables or explanatory variables (X) on independence variables (Y). The independence variable (Y) in this study is the GDP of the Sukabumi City Fisheries Sector. Meanwhile, the free variables in the research hypothesis are the value of fish enlargement production (X1), the production value of fish hatchery (X2), the value of aquarium fish production (X3) and the value of fishery processed production (X4). The Ordinal Least Square method is used as a hypothesis test method. To continue the analysis, the 4 assumptions are fulfilled, namely data normality analysis, heterokesdasity analysis, autocorrelation analysis, and multicollinearity analysis

The results of the Normality Analysis with shapiro-Wilk W test showed the value of Prob > z = 0.276, the value of this Probability exceeds the value of 0.05 which indicates that the data is distributed normally. The results of the Analysis of Heterokesdascity with the Breusch-Pagan test method showed that the value of chi2 = 3.77 with a probability of prob > chi2 = 0.0523 or greater than 0.05, these results showed that there was no heterochemicity problem in the research model. Autocorrelated analysis results with the Breusch-Godfrey LM Test method showed prob>chi2 of 0.739 or greater than 0.05, these results showed that the data was free from autocorrelated problems. The results of the multicollinearity analysis showed a VIF value of 4.02. The value is below the number 10 so that it can be ascertained that there are no multicollinearity problems in the model, from 4 assumptions, regression analysis can be continued. The results of regression analysis are presented in the table below :

Table 7. Results of regression parameter analysis with OLS

Variable	Coefisien	Standard Error	p-value
Fish enlargement production value (X1)	0,000007 *	0,00000354	0,093
Fish hatchery production value (X2)	0,000011 **	0,0000043	0,049
Aquarium fish production value (X3).	0,000042 **	0,0000117	0,012
Processed Fish Production Value (X4)	0,000003 **	0,00000111	0,038
Constant	12,18 ***	0,047	0,000
Number of observation	11		
R-squared	0,9763		
Adj R-squared	0,9606		
Fhit	61,91		
Prob > F	0,0001		

Significant: *** <0,01, ** <0,05, * <0,1,

From the table above, the regression equation that can be presented is as follows :

$\ln Y = 12{,}18 + 0{,}000007\ X_1 + 0{,}000011\ X_2 + 0{,}000042\ X_3 + 0{,}000003\ X_4$

The results of the analysis showed that all fisheries sub-sectors contributed to contributing regional income, ranging from hatchery, enlargement, processing and production of ornamental fish, as done in other countries, China's fisheries sector alone produces 13.1̃3-14.44 million jobs, accounting for about 1% of the total population . In the arrangement, policymakers can take steps to support training education to foster professional fisheries engineers so that the fisheries sector becomes the leading sector (Wang & Wang, 2021). Alternative development strategies in processing fishery products include: maintaining product quality to increase customer loyalty, technological innovation

to improve production efficiency, improving capital access capabilities, optimizing government assistance by increasing productivity and management capabilities, improving business management capabilities and marketing technology (Setyowati et al., 2016)

Klassen Typology Analysis

Klassen typology analysis is a tool of analyzing the economic typology of a sector. Klassen's typology analysis can map the growth rate and gap of a sector. Klassen typology analysis identifies a sector into four quadrants that have different characteristics.

Table 8. Results of Klassen Typology Analysis of 4 fisheries sub-sectors of Sukabumi City

Variable	Sukabumi City		West Java		Analysis Results	Quad-rant
	Growth	Contribute	Growth	Contribute		
Enlargement fish	2,09%	20,34%	13,27%	54,48%	Left behind	4
Hatchery fish	34,29%	4,60%	4,74%	24,09%	Potential	3
Aquarium fish	42,14%	2,18%	20,51%	6,68%	Potential	3
Processing fish	4,43%	72,88%	25,21%	14,75%	Advance but oppresed	2

Source. Department of Food Security, Agriculture and Fisheries (DKP3, 2021)

The results showed that each sub-sector has a different quadrant position based on klasen typology, therefore the empowerment of the fisheries sector can still be done so that the potential of the fisheries sector continues to increase to meet national needs, increase GDP and exports. . Hasil penelitian Kodjo et al, 2021, recommend that relevant fisheries policies invest more in creating favorable conditions for fish farmers and fishermen to effectively increase domestic fish production. Therefore, the development of fishery infrastructure needs to be supported by hatchery and feed subsidies (N'Souvi et al., 2021).

Potential aquarium fish cultivators to be developed. In this cultivation, what needs to be considered here is the water requirements and the feed given to the fish determine the combination in the body of the ornamental fish. The growth of aquarium fish Black Molly, Poecilia sphenops, photo-oxidation of the improved surface associated with ZnS in the form of nanoparticles, dissolved oxygen content and the pH value of water found to be reduced in a way that depends on the dose of its normal value under exposure to Zn S nano particles. in various concentrations. physiological and behavioral responses to maintain appropriate organ function in a hypoxia environment. Fish show very varied feeding behavior this is not recommended in the maintenance of ornamental fish because it damages the ornament both physical and warn the aquarium fish (Bhattacharjee & Chatterjee, 2019), withdrawal of ethanol exposure showed increased swimming activity and decreased anxiety-related behavior compared to the associated controls on zebrafish life, a susceptibility to developing nervous systems, as well as a curved tail (Ramlan et al., 2017).

Determination of Priority Sectors

Determination of sub-sectors that can be a priority to be developed can be done by swearing. The priority ranking of sub-sectors is determined through weighting from the results of LQ analysis, regression and Klassen typology. Rangking 1 with value is 4, rangking 2 with value is 3, rangking 3 with value is 2 and rangking 4 with value is 1 .

Table 9. Determination of Priority sector

No	Sub Sectors	LQ		Regression		Typology Klassen		Sum of weight	Priority Ranking
		Rank-ing	Weight	Rank-ing	Weight	Rank-ing	Weight		
1.	Enlargement fish	3	2	4	1	4	1	4	4
2.	Hatchery fish	4	1	2	3	2	3	7	3
3.	Aquarium fish	2	3	1	4	1	4	11	1
4.	Processing fish	1	4	3	2	3	2	8	2

Based on the results of the study shows that the main priority that can be developed is the cultivation of ornamental fish, then the enlargement of the fishery product processing industry, the third is the fish seeding sector and finally the enlargement of fish. This happens because ornamental fish can still be developed for export purposes at a good price, the processing sector benefits because the fisheries sector is easily damaged so that it has a long shelf life and a wide marketing range needs to be processed first. While the hatchery and enlargement sectors are interrelated what needs to be done is to foster the community to be willing to develop this sector to increase its income, the guarantee of fishery product distribution channels determines the development of this sector, local and regional distribution channels and specifically utilizes flexibility, organization, and learning to reuse existing networks, to support ongoing supply chain operations and sustainable food provision during macroeconomic crises, (Bassett et al., 2021). Processed foods containing fish can also affect the content of MDT (Marine Derived Tocoopherol) in the human body, (Gotoh et al., 2011).

Fish farming is highly dependent on fish seeds and feed, the use of superior fish seeds can increase the profitability of business actors and improving the quality of feed also provides a significant increase in profitability but the quality of feed also increases the cost needed in one harvest (Suryani et al., 2021)

CONCLUSION

The fisheries sector can still be developed and used as a sub-sector contributing to GDP for the city of Sukabumi in particular and West Java in general. Based on the results of data analysis, the recommendations that can be submitted in the development of the fisheries sector in order to increase GDP are :

1. The first priority of development is the sub-sector of aquarium fish.
   Although not a non-base sector, but with good development planning, this sub-sector has the potential to become a base sub-sector in Sukabumi City. This sub-sector has the highest influence on the GDP of the fisheries sector and relatively increased growth. The advice conveyed by improvements in breeding technology and maintenance of aquarium fish needed by the export market, as a land for increasing GDP and foreign exchange of the country .
2. The second priority is the processed fisheries sub-sector.
   This sub-sector is the base sector with the highest production value compared to other fisheries sub-sectors. However, the growth of this sector tends to be waved and stagnant. Nonetheless, this sub-sector still has the potential to be developed considering that this sub-sector is the highest contributor and statistically significant. The advice conveyed, using the right processing technology, assessment of the processed fish export market, so that the quality and quantity of processing products meet ISO requirements for the development of processed exports. One form of fish processing developed is the processing of dried fish ready for export. (Pradhan et al., 2022). The high demand for MAW (fish swim bladder) is a waste processing of fish

catches is a development of clean technology based on processed fish. (Ben-Hasan et al., 2021)

3. The third priority is the fisheries sub-sector.
   Although the contribution of this sub-sector is relatively low, but statically the influence of this sub-sector on the increase in the GDP of the Sukabumi City fisheries sector is quite high. In addition, this sub-sector belongs to the sector that has high growth. The advice is conveyed using fish hatchery technology so that the yield of fish seedlings obtained is higher. The use of sector-based fisheries vulnerability assessment tools (Fish Vool) to evaluate the vulnerability of primary fishery commodities so as to produce quality hatchery, optimal fish growth (Jacinto et al., 2015)
4. The fourth priority is the fisheries enlargement sub-sector.
   This sub-sector although it has a fairly high production value, but statistically the influence of this sub-sector on the GDP of the fisheries sector is not so strong. In addition, this sub-sector belongs to the lagging sector where contribution and growth are relatively lower than the same sector in West Java Province as a reference area. Suggestions that can be delivered using more efficient fish farming technologies such as Bioflok and floating nets.

REFERENCES

Ault, J. S., Smith, S. G., Johnson, M. W., Grove, L. J. W., Bohnsack, J. A., DiNardo, G. T., McLaughlin, C., Ehrhardt, N. M., McDonough, V., Seki, M. P., Miller, S. L., Luo, J., Blondeau, J., Crosby, M. P., Simpson, G., Monaco, M. E., Pollock, C. G., Feeley, M. W., & Acosta, A. (2022). Length-based risk analysis of management options for the southern Florida USA multispecies coral reef fish fishery. *Fisheries Research*, *249* (August 2021), 106210. https://doi.org/10.1016/j.fishres.2021.106210

Bassett, H. R., Lau, J., Giordano, C., Suri, S. K., Advani, S., & Sharan, S. (2021). Preliminary lessons from COVID-19 disruptions of small-scale fishery supply chains. *World Development*, *143*, 105473. https://doi.org/10.1016/j.worlddev.2021.105473

Ben-Hasan, A., Sadovy de Mitcheson, Y., Cisneros-Mata, M. A., Jimenez, É. A., Daliri, M., Cisneros-Montemayor, A. M., Nair, R. J., Thankappan, S. A., Walters, C. J., & Christensen, V. (2021). China's fish maw demand and its implications for fisheries in source countries. *Marine Policy*, *132*(July). https://doi.org/10.1016/j.marpol.2021.104696

Bhattacharjee, B., & Chatterjee, N. (2019). Constrained growth of the aquarium fish black molly, poecilia sphenops (valenciennes, 1846), under the exposure of zns nanoparticles. *Materials Today: Proceedings*, *11*, 879–888. https://doi.org/10.1016/j.matpr.2019.03.060

Gotoh, N., Mashimo, D., Oka, T., Sekiguchi, K., Tange, M., Watanabe, H., Noguchi, N., & Wada, S. (2011). Analyses of marine-derived tocopherol in processed foods containing fish. *Food Chemistry*, *129*(2), 279–283. https://doi.org/10.1016/j.foodchem.2011.04.041

Grema, H. A., Kwaga, J. K. P., Bello, M., & Umaru, O. H. (2020). Understanding fish production and marketing systems in North-western Nigeria and identification of potential food safety risks using value chain framework. *Preventive Veterinary Medicine*, *181*, 105038. https://doi.org/10.1016/j.prevetmed.2020.105038

Grillo-Núñez, J., Mendo, T., Gozzer-Wuest, R., & Mendo, J. (2021). Impacts of COVID-19 on the value chain of the hake small scale fishery in northern Peru. *Marine Policy*, *134*. https://doi.org/10.1016/j.marpol.2021.104808

Jacinto, M. R., Songcuan, A. J. G., Yip, G. Von, & Santos, M. D. (2015). Development and application of the fisheries vulnerability assessment tool (Fish Vool) to tuna and

sardine sectors in the Philippines. *Fisheries Research*, *161*, 174–181. https://doi.org/10.1016/j.fishres.2014.07.007

Lu, G., & Luo, M. (2020). Genomes of major fishes in world fisheries and aquaculture: Status, application and perspective. *Aquaculture and Fisheries*, *5*(4), 163–173. https://doi.org/10.1016/j.aaf.2020.05.004

Mavuru, A., Mhlanga, L., & Nhiwatiwa, T. (2022). An assessment of Post-Harvest Fish Losses (PHFLs) in the artisanal fishery of Lake Kariba, Zimbabwe. *Scientific African*, *16*, e01124. https://doi.org/10.1016/j.sciaf.2022.e01124

Merican, Z., & Sanchez, D. (2016). Overview of the aquaculture feed industry. In *Aquafeed Formulation*. Elsevier Inc. https://doi.org/10.1016/B978-0-12-800873-7.00001-4

N'Souvi, K., Sun, C., Zhang, H., Broohm, D. A., & Okey, M. K. N. (2021). Fisheries and aquaculture in Togo: Overview, performance, fisheries policy, challenges and comparative study with Ghana, Mali, Niger and Senegal fisheries and aquaculture. *Marine Policy*, *132*(September 2020). https://doi.org/10.1016/j.marpol.2021.104681

Ng'onga, M., Kalaba, F. K., & Mwitwa, J. (2019). The contribution of fisheries-based households to the local economy (Capital and Labour) and national fish yield: A case of Lake Bangweulu fishery, Zambia. *Scientific African*, *5*. https://doi.org/10.1016/j.sciaf.2019.e00120

Nurkholis, Nuryadin, D., Syaifudin, N., Handika, R., Setyobudi, R. H., & Udjianto, D. W. (2016). The Economic of Marine Sector in Indonesia. *Aquatic Procedia*, *7*, 181–186. https://doi.org/10.1016/j.aqpro.2016.07.025

Mansaray, H. E. (2021). A Study of the Socioeconomic Impact of Mobile Phones on SMEs in the Waterloo Community, the Western Rural District of Sierra Leone. Randwick International of Social Science Journal, 2(2), 10-21. https://doi.org/10.47175/rissj.v2i2.211

Pasaribu, Y. P., Buyang, Y., Suryaningsih, N. L. S., Dirpan, A., & Djalal, M. (2020). Effect of steaming and pressurized boiling process to the nutrient profile of Papuan cork fish Channa striata as potential protein-rich food to prevent stunting. *Medicina Clinica Practica*, *3*, 100120. https://doi.org/10.1016/j.mcpsp.2020.100120

Pradhan, S. K., Nayak, P. K., & Armitage, D. (2022). A social-ecological systems perspective on dried fish value chains. *Current Research in Environmental Sustainability*, *4*(January), 100128. https://doi.org/10.1016/j.crsust.2022.100128

Ramlan, N. F., Sata, N. S. A. M., Hassan, S. N., Bakar, N. A., Ahmad, S., Zulkifli, S. Z., Abdullah, C. A. C., & Ibrahim, W. N. W. (2017). Time dependent effect of chronic embryonic exposure to ethanol on zebrafish: Morphology, biochemical and anxiety alterations. *Behavioural Brain Research*, *332*(February), 40–49. https://doi.org/10.1016/j.bbr.2017.05.048

Setyowati, N., Rahayu, W., & Ishartani, D. (2016). Development of Tuna Processed Business in Pacitan District, Indonesia. *Aquatic Procedia*, *7*, 160–165. https://doi.org/10.1016/j.aqpro.2016.07.022

Sipayung, P. D. (2022). Insurance Business in Economic Development in Pematangsiantar City. *Randwick International of Social Science Journal*, 3(1), 199-210

Skleničková, K., Koloušek, D., Pečenka, M., Vejmelková, D., Šlouf, M., & Růžičková, I. (2020). Application of zeolite filters in fish breeding recirculation systems and their effect on nitrifying bacteria. *Aquaculture*, *516*(July 2019). https://doi.org/10.1016/j.aquaculture.2019.734605

Sogn-Grundvåg, G., Zhang, D., Henriksen, E., Joensen, S., Bendiksen, B. I., & Hermansen, Ø. (2022). Fishing tactics and fish quality: The case of the coastal fishery for Atlantic cod in Norway. *Fisheries Research*, *246* (November 2021).

https://doi.org/10.1016/j.fishres.2021.106167

Suryani, E., Hendrawan, R. A., Ardianto, M. A. D., Wijaya, I. W. R., & Satrio, M. G. (2021). Digitalization of the fishery industry and strategy to increase pool productivity in improving the profitability of the biomaxi fish raiser community. *Procedia Computer Science*, *197*(2021), 617–626. https://doi.org/10.1016/j.procs.2021.12.182

Villasante, S., Sumaila, R., Da-Rocha, J. M., Carvalho, N., Skerritt, D. J., Schuhbauer, A., Cisneros-Montemayor, A. M., Bennett, N. J., Hanich, Q., & Prellezo, R. (2022). Strengthening European Union fisheries by removing harmful subsidies. *Marine Policy*, *136*. https://doi.org/10.1016/j.marpol.2021.104884

Wamukota, A., Brewer, T. D., & Crona, B. (2014). Market integration and its relation to income distribution and inequality among fishers and traders: The case of two small-scale Kenyan reef fisheries. *Marine Policy*, *48*, 93–101. https://doi.org/10.1016/j.marpol.2014.03.013

Wang, Y., & Wang, N. (2021). Exploring the role of the fisheries sector in China's national economy: An input–output analysis. *Fisheries Research*, *243* (April), 106055. https://doi.org/10.1016/j.fishres.2021.106055