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THE ROLE OF FISHERY SECTOR AND MINAPOLITAN AREA IN EAST JAVA: AN INPUT-OUTPUT APPROACH

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ABSTRACT
The wealth of Indonesia's nature is mostly obtained from the abundant marine products. The ocean area of about 7.1 million square kilometers makes Indonesia have very diverse sea products. Of course, this is an opportunity for Indonesia to increase the productivity of its marine products. The increase in marine products must be accompanied by the development of an economic driving force in a Minapolitan area. This study provides an overview of the sectors that are directly related to the fishery sector. At a higher stage, this research is targeted to be able to obtain a multiplier matrix input-output formation which can predict the impact of the development on the fishery sector to increase employment opportunities and income for an economic growth sector. It is important to understand that the development of the fishery economic sector is essential because the Minapolitan area is one of the leading regions that is expected to contribute to state revenue. Besides, to increase the gross regional domestic income, the Minapolitan area also has the opportunity to increase labor productivity.

KEY WORDS
Input, output, Minapolitan, social aspects, East Java.

Indonesia is a country with the most generous and rich marine resources in the world. The total area of waters of 7.1 million km^2 makes Indonesia rich in marine products. The fishery sector is one of the leading commodities with all abundant biodiversity, it makes the Indonesian marine rich in various types of fish with high economic value. Fishermen as one of the sole actors who support this sector must be supported by adequate infrastructure improvements. this must be done in line with efforts to increase the production of fishery in Indonesia. One of the ways and efforts that can be done to drive and improve the economy of coastal communities is to develop the Minapolitan concept, namely the concept of area-based development management with a driving force in the marine and fishery sector (Abidin et al, 2019), (Arnawa et al, 2017). The Minapolitan area is expected to be a center of growth for the surrounding areas (Maya, 2018).

The better infrastructure improvements in the Minapolitan area (Putro et el, 2018) have now been carried out by local and central governments as seen in the feasibility of transportation, energy, electricity, clean water, and other public facilities. The main objective is the improvement of facilities to support activities in the fishery sector, it is also expected to affect other sectors, both backward linkage sectors such as the fishing net industry to catch fish, boats, boat fuel, in this case, can be gasoline or diesel, fishing workshops, and others, as well as related to the future (forward linkage) such as the processed fish industry after being caught by fishermen and brought by collectors to fish canning factories, fish crackers, flour, and various other processed products. of course, all of this requires good and linear synergy.

East Java is one of the provinces that contributes to the largest national fishery products to 401,600 tons per year in 2015 (KKP, 2017). East Java's enormous fishery potential makes it a national fishery barn. The great potential of fishery in East Java is a challenge for stakeholders and the government to be able to improve and develop it as one of the regional economic drivers. Unfortunately, the potential of marine and fishery which should be utilized to improve the welfare of the wider community is still not optimal in the field

implementation (Ginting et al, 2018). Fishermen who are mostly involved in the local fishery business, their conditions have not shown adequate welfare. While the production value of the fishery sector in the structure of Gross Domestic Product was only 3.12% in 2009, this has also increased compared to 2005 which was only 2.15%. Following are the top 5 provinces in Indonesia with the highest income in the fishery sector in 2017:

Table 1 – The Five Biggest Provinces of Fishery Production in Indonesia, 2017

No	Province	Volume (tons)	Percentage (%)
1.	East Java	426.280	8.39
2.	North Sumatra	383.300	7.54
3.	Maluku	341.030	6.71
4.	Bali – Nusa Tenggara	315.930	6.21
5.	South Sulawesi	270.450	5.32

Source: BPS 2016, Data Processed.

Currently, some provinces in Indonesia have big fishery granaries, both marine and freshwater fishery products that now become the concern of the government. The empowerment of fishermen is done by developing the concept of Minapolitan, which is based on regional economic management development as a driving force in the marine and fishery sectors. The Minapolitan area is currently focused on several things, such as consumption of fresh fish, preservation of captured fish, freezing fish using a freezer, fish canning and fish meal. These five important points must be carried out for the achievement of the development of the Minapolitan area in the coastal environment. Research using the input and output approach is carried out to find out how big is the role of the fishery sector as one of the leading sectors of the region, besides that, by knowing the upstream (backward linkage) and the downstream (forward linkage) is expected to provide information on the sectors that play the role in developing the fishery sector and their impact on income, output and employment opportunities in the Province of East Java.

METHODS OF RESEARCH

The research covered the area of East Java and focused on the role of the fishery sector in the economy and employment opportunities in East Java Province. The analysis was carried out for 3 different periods, in 2005, 2010 and 2015. Five-year periods were conducted to adjust data availability. It was done to know structural changes and developments that have occurred. The data used in this study are quantitative and qualitative data sourced from the East Java Central Statistics Agency (BPS) publication and field observations, as well as online data published by the Ministry of Maritime Affairs and Fishery Office. The analytical tool used was the input-output analysis. Departing from input-output data (IO) classification of 66 x 66 sectors, it was aggregated into 19 x 19 sectors. The input-output model was used to examine the level of interrelation between various sectors in the economy to obtain a picture of the contribution of an economic sector to the economy as a whole or the potential growth of a sector (Sritua Arief, 1993). Prof. Wassily Leontief, the recipient of the Nobel Prize in economics in 1973, was the first compiler to input-output Tables. The framework of the I-O Table consists of 4 quadrants:

1. The first quadrant contains 'transactions between' which are transactions that occur between sectors and also intra-sector, which are used in the production system;
2. The second quadrant is a record of transactions from sectors directly used by end-users, or end-requests. Fields along the lines in this quadrant show the composition of the final demand for a production sector. While the contents throughout the column show the distribution of each component of the final demand according to sector supply;
3. The third quadrant shows the use of primary inputs. This quadrant records the costs of using inputs that enter the intermediate sector from outside the production system, in the sense that they are not purchased from companies in the local economy;

4. The fourth quadrant shows direct transactions between primary inputs that are distributed directly into the final request. This quadrant is often ignored because it records transactions that are not directly related to the production system.

RESULTS OF STUDY

East Java is a province with the highest number of city districts in Indonesia. It occupies the largest population beating the DKI Jakarta province. It makes East Java the most populous province in Indonesia. The output structure of East Java can be seen from the composition of the supply mostly derived from agricultural products, but its dependence on other regions is relatively small because most of the demands can be provided by themselves to meet their demand. While on the demand side, the production of agricultural products is largely to meet intermediate demand (for further processing into other products). Various types of companies and business sectors grow and become income in the economic sector. Based on the classification of 110 sectors, ten sectors have the largest output in the economy of East Java (Table 1) and are dominated by the cigarette industry and MSMEs.

Table 2 – Ten Largest Business Sectors by Output Ranking in East Java Province

No	Sector	Role (%)
1.	Cigarette industry	7,24
2.	Retail trade, not cars and motorcycles	5.46
3.	food and beverages	4.79
4.	Building construction	4.63
5.	Construction of civil buildings	4.51
6.	Information and communication	3.38
7.	Wholesale, not cars and motorcycles	2.96
8.	Government administration, defense and mandatory social security	2.41
9.	Educational Services	2.21
10.	Other non-metal mining industry	2.20
	Other sectors	60.21
	Total	100

Source: BPS 2016, Data Processed.

The productive sector such as the tobacco industry which is dominated by the number of cigarette factories is one of the sectors with the highest amount of income in terms of tax and non-tax revenue. The remaining 60% comes from other sectors and one of them is the fishing industry which is obtained from the catches of fishermen, companies and also fish ponds/fish farming.

The great potential of fishery in East Java can be seen from the geographical location of the region, where Southern water comes from Pacitan, Trenggalek, Tulungagung, Blitar, Malang, Lumajang, Jember, and Banyuwangi districts and for Northern water is from Situbondo, Probolinggo, Pasuruan, Sidoarjo, Tuban, Lamongan, Gresik, Bangkalan, Sampang, Pamekasan, Sumenep, Probolinggo City, Pasuruan City, and Surabaya City,

Fishery production in East Java in 2017 reached 1,628,418.7 tons (Table 2). The aquaculture dominates the fishery production in East Java, weighing for 73.75% while taking captive the fishery production accounted for 26.25% of all fishery production. Most of the captive fishery is obtained from the sea in the amount of 414,644.3 tons or 97%, the rest is gained from public waters. Aquaculture production reached 1,200,960.5 tons with details of 540,922.4 tons (45.04%) resulting from marine aquaculture production, 311,655.6 tons (25.95%) from pond aquaculture, 272,729.67 tons (22, 71) from ponds, 1,880.7 tons (0.16%) from nests and 10,888.16 tons (0.91%) from floating nets and 62,873.97 tons (5.24%) from *mina padi.*

A great number of the population working in the fishing industry comes from coastal communities and fish farmers and in 2017, 128,161 households were working in this sector, the large value of marine fishes coupled with fish farming which reached more than 70% made a lot of labor needed. A total of 68,866 households rely on the fishing fishery, this

figure covers 53.73% of all fishing households. Most of them with 94.93% percentage of looking for fish and caught in the sea, while others with 5.07% percentage of looking for fish in public waters. The number of households whose work is cultivating fish is 59,295 households. Some of them cultivate fish in the sea with a percentage of about 13.03%, aquaculture ponds of 35.26%, floating nets or commonly referred to as floating cages (usually in ponds/reservoirs/lakes) with a percentage of 4.58% and the last yan is with *mina padi* method 46.31%.

Table 3 – East Java Fishery Production in 2017

Fishery	Production (tons)	Percentage
Fishing	427.458,20	26,25
Sea Fishing	414.644,30	97,00
Public Water	12.813,90	3,00
Aquaculture	1.200.960,50	73,75
Sea Cultivation	540.922,40	45,04
Fishpond	311.665,60	25,95
Pond	272.729,67	22,71
Cage	1.880,70	0,16
Floating Nets	10.888,16	0,91
Mina Padi	62.873,97	5,24
Total	1.628.418,70	

Source: East Java Province in Figures, 2018.

Although the number of aquaculture farmers is relatively less (46.27%) compared to the fishermen, the number of production is far greater (73.75%) compared to captive fishery production. This shows that their productivity (aquaculture fish farmers) is relatively greater when compared to the productivity of the captive fishery.

Table 4 – Number of Households in the Fishery sector 2017

Fishery	Production (tons)	Percentage
Fishing	68.866	53,73
Sea Fishing	65.374	94,93
Public Water	3.492	5,07
Aquaculture	59.295	46,27
Sea Cultivation	7.728	13,03
Fishpond	20.908	35,26
Pond	484	0,82
Cage	2.718	4,58
Floating Nets	27.457	46,31
Total	128.161	

Source: East Java Province in Figures, 2018.

Calculations using the East Java 2015 Input-Output Table can be obtained by the technical coefficient value, which is then used to measure the degree of sensitivity index to estimate the magnitude of backward linkages, and to measure the power distribution index to estimate the magnitude of *forward linkages*. This study aggregates 110 sectors into 30 sections. The results of calculations on the measurement of the dispersion power index and sensitivity index are shown in the following Table 4.

From the Table above it can be found that the sectors included in group I (high FW and BW) include:

- Fish And Aquatic Biota Processing And Preservation Industries;
- Rice & Rice Mill Industries;
- Food, Beverage And Cigarette Industries;
- Fertilizers And Pesticides, Chemical, Pharmaceutical Industries;
- Rubber, Plastic, Glass Industries;
- Quarry, Metal & Metal Product Industries.

Table 5 – Spread Power Index and Sensitivity LEVEL Index

No.	Sector	Power Distribution Index	Degrees of Sensitivity Index
1	Agricultures	0.8142	0.9896
2	Farmsteads	0.7472	0.7835
3	Animal Husbandries	0.8841	0.8133
4	Forestry	0.7570	0.7017
5	Marine Fish And Marine Fishery Products	0.8020	0.7990
6	Mainland Fish And Mainland Fishery Products	0.8760	1.1050
7	Mining	0.9260	1.0138
8	Fruit, vegetable, Fat, Milk Processing & Preserving Industries	1.1290	0.9823
9	Fish And Aquatic Biota Processing And Preservation Industries	1.2340	1.1500
10	Rice & Rice Mill Industries	1.1070	1.0070
11	Food, Beverage And Cigarette Industries	1.1234	1.2453
12	Textile, Clothing, And Leather Industries	0.9778	0.7388
13	Industries Of Wood, Cork, Matting, Rattan, Etc.	0.9720	0.8900
14	Paper, Printing, And Reproduction Of Recording Media Industries	1.0840	0.8235
15	Fertilizers And Pesticides, Chemical, Pharmaceutical Industries	1.2598	1.4968
16	Rubber, Plastic, Glass Industries	1.3167	1.9927
17	Quarry, Metal & Metal Product Industries	1.2890	1.2773
18	Computer, Electronic & Optical Industries	1.1570	0.6480
19	Electrical Equipment Industries	1.1670	0.6460
20	Manufacture Of Machinery, Equipment & Repairs	1.0990	0.7000
21	Industries Of Motor Vehicles, Trailers & Other Conveyances	0.8865	0.7255
22	Other Furniture & Processing Industries	1.1280	0.6945
23	Electricity, Gas, Drinking Water, Waste Management	1.0233	0.9450
24	Buildings	1.0963	0.7697
25	Car, Motorcycle & Repair Trade	0.8025	1.181
26	Sale And Retail Trade	0.8185	2.83
27	Transportation And The Supporting Services	1.1637	0.9867
28	Posts, Accommodation, Information & Communication Provision	0.9668	1.1638
29	Banks & Financial Institutions	0.9188	0.9425
30	Real Estate And Other Services	1.0470	0.7912

Sectors classified as group II (high FW, low BW) are:

- Fruit, Vegetable, Fat, Milk Processing & Preserving Industries;
- Paper, Printing, And Reproduction Of Recording Media Industries;
- Computer, Electronic & Optical Industries;
- Electrical Equipment Industries;
- Manufacture Of Machinery, Equipment & Repairs;
- Furniture and other Processing Industries;
- Electricity, Gas, Drinking Water, Waste Management;
- Buildings;
- Transportation and transportation support service;
- Real estate and other services.

Group III (low FW, high BW):

- Transportation and transportation support service;
- Mining;
- Car, motorcycle and repair trade, sale and retail trade;
- Posts, Accommodation, Information & Communication Provision.

Group IV (low FW, low BW):

- Agricultures, Plantations, Animal Husbandries;
- Forestry;
- Marine Fish And Marine Fishery Products;
- Textile, clothing and leather industries;
- Industries of Wood, Cork, Matting, Rattan, etc;
- The industries of motor vehicles, trailers, and other conveyances;
- Banks and financial institutions.

DISCUSSION OF RESULTS

The ten leading economic sectors of East Java that have been described above are a small part of the 110 total economic sectors in the province. Sectors included in the input-output Table structure are classified into 110 economic sectors. Sectors included in the fishery are sector 29, which is the marine fish sector and marine fishery products, sector 30 is the land fish sector and mainland fishery products.

Constantly, many products produced by East Java cannot be separated from long-term problems. The need for government intervention for this matter in such the Ministry of Maritime Affairs and Fishery and related stakeholders to overcome this problem. Until the end of this study, it is found that the need for a forward linkage and backward linkage put forward by Rasmussen (1956) and Hirschman (1958), which explains that there is a need for a link between forward and backward linkages. What is meant by backward linkage is the underlying thought that if you want to increase the output of a thing, then you need to think about the input needed to support it.

Backward linkage analysis is based on the idea that if it will increase the output of a sector, say sector 1, then it will need supporting inputs. The inputs used in the production of sector 1 output can be from sector 1 or other sectors. Therefore an increase in output demand from sector 1 will be followed by derived demand for the sector itself and also from other related sectors which are used as input for sector i. Such inter-sectoral linkages are referred to as backward linkage. The economic sectors in the input-output Table structure are classified into 110 economic sectors. Sectors included in the fishery are sector 29, which is the marine fish sector and marine fishery products, sector 30 is the land fish sector and mainland fishery products.

The marine fish sector and marine fishery products, using intermediate input from other sectors (the total is decreasing), are 4,544,988. This sector is much related to the sectors behind it (the largest), namely the animal food industry, food and beverage supply, plastic goods industry, and the marine fish and marine fishery sector itself. This sector sells its output to other sectors in front of it to be used as an intermediate input of 5,531,644.36. This figure shows that the marine fish and marine fishery products play more roles as suppliers to the sectors ahead than their role as users. The most related sectors going forward from this sector are the basic chemical industry, food, and beverage supply as well as the fish processing and preserving industry and aquatic biota.

Thus, it can be concluded that the mainland fish and mainland fishery sector has more roles as suppliers that drive the sectors in the future. Sectors related to the backward sector of mainland fish and mainland fishery products are the animal food industry, mainland fish and mainland fishery products themselves, the processing and preserving industry of fish and aquatic biota, and corn. Sectors related to the future with the land fish and mainland fishery products are the basic chemical industry, the fish processing and preserving industry and aquatic biota, the food, and the beverage supply industry.

CONCLUSION

East Java has overwhelming captive fish and aquaculture resources. Results that reach 1.2 million tons in 2017 make East Java become the largest fishery producer in Indonesia. This fishery product has a close connection with the previously mentioned sectors. Linkages with other producers such as fish canning, fish preservation of basic chemical industries, processing of aquatic biota and even prior attachments such as the animal feed industry are very important in the sustainability of fishery in East Java. This is also proven by a large number of fish farmers in 2017 which is shown by BPS statistics. All of that explains that fishery production in East Java is classified as very good and is expected to be able to be emulated by other provinces for the creation of food self-sufficiency, especially in the field of capture fish and aquaculture.

REFERENCES

1. Abidin Z., Setiawan B., Soemarno, Primyastanto M., Sulong A. 2019. Ecological and Socio-economic Sustainability of Ornamental Fish Business in Minapolitan Area of Blitar Regency, East Java, Indonesia. IOP Conference Series: Earth and Environmental Science, Volume 239, the 12th International Interdisciplinary Studies Seminar - Environmental Conservation and Education for Sustainable Development.
2. Arnawa I K., Sukerta I K., Martiningsih NGA, Astuti P S. 2017. Minapolitan Area Development Strategy: An Effort to Increase Fisherman Income, Gianyar regency, Bali Indonesia. International Journal of Life Sciences. Vol 1 No 2.
3. Maya N V., 2018. The Development of Minapolitan Area Based on Participatory Planning in Increasing Fishermen Community Welfare: A Study in Minapolitan Area of Sei Ijum Raya Village, East Kotawaringin Regency. Russian Journal of Agricultural and Socio-Economic. Vol 5, No. 77.
4. Putro, S P., Wulandari A., Muhammad F. 2018. Ecotourism development strategy at minapolitan area of Menayu Village, Magelang District, Central Java, Indonesia. Journal of Physics: Conference Series, Volume 1217.
5. Anonymous, 2017. Ministry of Maritime Affairs and Fisheries Performance Report 2017. http://kkp.go.id/an-component/media/upload-gambar-pendukung/kkp/LAPORAN/Laporan%20Kinerja%20KKP%202017%20(REV_4-%20(28Maret).pdf.
6. Ginting B., Nasution M A., Subhilhar., Harahap R H. 2018. Analysis of Weaknesses of Coastal Community Economy Empowerment Program (Pemp) and National Program of Community Empowerment of Independent Marine and Fisheries (Pnpm-Mkp) on Traditional Fishermen in Indonesia. Junior Scientific Researcher , Vol. 4, No. 1.
7. Arief. S. 1993. Metodologi Penelitian Ekonomi. UI-Press.
8. Anonymous. 2016. Central Bureau of Statistics. Statistik Indonesia 2016. https://www.bps.go.id/publication/download.html?nrbvfeve=N2FhMWU4ZjkzYjQxNDgyMzRhOWI0YmMz&xzmn=aHR0cHM6Ly93d3cuYnBzLmdvLmlkL3B1YmxpY2F0aW9uLzIwMTYvMDYvMjkvN2FhMWU4ZjkzYjQxNDgyMzRhOWI0YmMzL3N0YXRpc3Rpay1pbmRvbmVzaWEtMjAxNi5odG1s&twoadfnoarfeauf=MjAyMC0wNC0wMiAxNjozODozOQ%3D%3D.
9. Rasmussen, P.N., 1956. Studies in Inter-Sectoral Relations. Einar Harcks, København.
10. Steinback. Scott R. & Eric M. Thunberg. 2006. Northeast Region Commercial Fishing Input-Output Model. US Department of Commerce. National Oceanic & Atmospheric Administration. April.
11. Anonymous 2018. Central Bureau of Statistics East Java Province. https://jatim.bps.go.id/publication/download.html?nrbvfeve=OTk5OWI3MjdkMzE2YzAwNmVlMmZkN2U3&xzmn=aHR0cHM6Ly9qYXRpbS5icHMuZ28uaWQvcHVibGljYXRpb24vMjAxOC8wOC8xNi85OTk5YjcyN2QzMTZjMDA2ZWUyZmQ3ZTcvcHJvdmluc2ktamF3YS10aW11ci1kYWxhbS1hbmdrYS0yMDE4Lmh0bWw%3D&twoadfnoarfeauf=MjAyMC0wNC0wMiAxNjo1Mjo1Ng%3D%3D.